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REMARKS

The Office Action of November 24, 2003 has been received and its contents carefully reviewed. Applicant would like to thank the Examiner for the consideration given to the above-identified application.

By this Preliminary Amendment, claim 1 has been amended and claims 2-9 are withdrawn. Accordingly, claim 1 is pending for consideration. Applicant respectfully requests reconsideration and allowance of the pending claim.

Turning to the Office Action, initially, claim 1 has been objected to as including minor informalities. As can be seen from the forgoing amendments, claim 1 has been amended to cure those informalities noted by the Examiner. Accordingly, it is respectfully submitted that claim 1 is now in proper formal condition for allowance.

With reference to paragraph 3 of the Office Action, claim 1 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Applicants Admitted Prior Art in view of U.S. Patent No. 6,235,633B1 to Jang. In view of the amendments above and the comments provided below, this rejection is respectfully traversed and reconsideration and allowance of independent claim 1 is earnestly solicited.

As can be seen from the foregoing amendments, independent claim 1 is directed to a method for manufacturing a semiconductor device including the steps of depositing an interlayer insulating film on a substrate, forming a plurality of contact holes running through the interlayer insulator film, depositing a conductive material film on the interlayer insulator film, removing the conductive material film until a surface of the interlayer insulator film provided between the plurality of adjacent contact holes is exposed so as to separate the plurality of adjacent contact holes and to form a plurality of plugs made of the conductive material film filing the plurality of contact holes, and removing the tapered portions so as to

expose the unexposed interlayer insulator film provided between the plurality of adjacent contact holes in step (d), and separating an upper portion of the plurality of adjacent contact holes. Clearly, the combination proposed by the Examiner fails to disclose or remotely suggest these features.

Particularly, as the Examiner can readily appreciate, the novel feature of the present claimed invention resides in the removing of the tapered portions so as to expose the unexposed interlayer insulator film provided between the plurality of adjacent contact holes in the step (d), and separating an upper portion of the plurality of adjacent contact holes. In doing so, short circuiting of the plug can be prevented. As the Examiner notes, the prior art as admitted by the Applicant discloses a method of manufacturing a semiconductor device having steps similar to those set forth in steps (a)-(d) of the presently claimed invention. However, the prior art set forth by Applicant as well as that recited by Jang clearly fails to disclose or remotely suggest the subject matter set forth in step (e) of the presently claimed invention. Accordingly, it is respectfully submitted that Applicant's invention as set forth in independent claim 1 clearly distinguishes over the combination proposed by the Examiner.

As noted hereinabove and as readily appreciated by the Examiner, Applicant's Admitted Prior Art clearly fails to teach step (e) as presently set forth in independent claim 1. In order to overcome this shortcoming, the Examiner relies on the teachings of Jang wherein the Examiner states that Jang teaches a method of forming a semiconductor device including depositing an interlayer insulator 20, 22, forming contact holes in the interlayer insulator where the contact holes have a tapered portion at a top of the holes, depositing a conductive material 28 in the contact holes, and removing a portion of the conductive material to form plugs in the contact holes. It is noted from a review of the Jang reference that this reference more accurately teaches a method for forming a contact including the steps of depositing an inner layer insulating film 20 and a SiO₂ hard mask layer 22, forming

a tapered contact hole in the hard mask layer 22 as shown in Fig. 3, forming a metal layer 28 in the contact hole as noted in Fig. 4, and the removing a part of the metal layer 28 and forming a plug in the contact hole as noted in Fig. 5. Accordingly, it is noted that the step of forming the plug as shown in Fig. 5 of Jang that the metal layer 28 is removed until the surface of the hard mask layer 22 between the adjacent contact holes 2 is exposed by a first CMP. Additionally, the tapered portion of the hard mask layer 22 is also removed so as to separate the adjacent contact holes and forming the plug that buries the contact hole 2. However, in further reference to Jang, once the surface of the hard mask layer 22 is exposed, the surface of all the hard mask layer 22 provided between the adjacent contacts are simultaneously exposed and the separation of all the contact holes is completed as noted in Fig. 5.

To the contrary, in accordance with the present invention in step (d), even when the conductive material film is removed until a surface of the interlayer insulator film provided between the plurality of adjacent contact holes is exposed so as to separate the plurality of adjacent contact holes, a portion of the surface of the interlayer insulator film between the adjacent contact holes is not exposed and some of the contact holes are not separated. Accordingly, as is set forth in accordance with Applicant's claimed invention in step (e) (a second CMP step) is included to completely separate the contact holes by exposing the interlayer insulator film between the contact holes that are not being separated in the step (d). Consequently, it is respectfully submitted that Applicant's claimed invention clearly distinguishes from the teachings of Jang.

It is further noted that, while the object of the Jang reference is similar to that of Applicant's claimed invention Jang merely discloses removing the tapered portion of the hard mask layer between the adjacent contact holes to expose the hard mask layer, and a case where all the contact holes can be separated simultaneously. With Jang, even after

removing the conductive material film until a surface of the interlayer insulator film provided between the plurality of adjacent contact holes is exposed and the contact holes are separated, part of the contact holes are not completely separated. Accordingly, Jang fails to teach or suggest the solution to the problem encountered in the prior art in the manner set forth in accordance with Applicant's claimed invention. That is, Jang fails to disclose or suggest removing the tapered portions so as to expose the unexposed interlayer insulator film provided between the plurality of adjacent contact holes and separating an upper portion of the plurality of adjacent contact holes.

Consequently, while Jang may teach removing the tapered portion of the contact holes, Jang fails to disclose that which is set forth by step (e) in Applicant's claimed invention which includes completely separating the contact holes by exposing the interlayer insulator film between the contact holes that are not previously separated in step (d). Accordingly, in that the combination proposed by the Examiner fails to disclose or suggest that which is presently set forth by Applicant's claimed invention, it is respectfully submitted that Applicant's claimed invention as set forth in independent claim 1 is in proper condition for allowance.

With respect to the Examiner's response to Applicant's previous arguments, with the foregoing amendments as well as that discussed in detail hereinabove, it is respectfully submitted that independent claim 1 now distinguishes over the teachings of Applicant's admitted prior art in view Jang and is in proper condition for allowance. That is, as noted hereinabove, the patent to Jang fails to include the step where the contact holes are completely separated by exposing the interlayer insulator film between the contact holes that are not previously separated. Accordingly, it is respectfully submitted that Applicant's claimed invention as in proper condition for allowance.

Therefore, in view of the foregoing it is respectfully requested that the objections and

rejections be reconsidered and withdrawn by the Examiner, that claim 1 be allowed and that the application be passed to issue.

Should the Examiner believe a conference would be of benefit in expediting the prosecution of the instant application, he is hereby invited to telephone counsel to arrange such a conference.

Respectfully submitted,



Donald R. Studebaker
Reg. No. 32,815

Nixon Peabody LLP
401 9th Street N.W.
Suite 900
Washington, D. C. 20004
(202) 585-8000